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EDITORIAL NOTES

FUEL ECONOMY

LAST week there was a very large attendance at a meeting at the Institution of Electrical Engineers convened at the request of the Mines Department to discuss the best ways and means of improving the use of fuel and power in existing industrial plants under present conditions. It was one of a series arranged by ten of the leading scientific and technical bodies concerned with the production and utilization of all types of fuel and energy. Meetings of a similar nature and under the same auspices had already been held in Manchester and Bristol. The meeting last week, a brief account of which appears in the "JOURNAL" to-day, was attended by the Secretary for Mines and presided over by Sir Harold Hartley, Chairman of the Fuel Research Board. Prior to this important gathering, at which, as was fitting, the Gas Industry was strongly represented, there was a luncheon at which Mr. Grenfell also addressed those present, setting out the needs of the day—and those of the immediate future—regarding the economical utilization, in whatever final form, of coal. The calling of the meeting—and of the previous ones—was indicative of the official recognition of the immense importance to the nation of the fuel interests, and we think that individually and in collaboration these industries can perform vital work in furtherance of the war effort. In a mechanical age, this is a war of machines, and their production is entirely dependent on the availability of heat supplies. Assurance of this availability is the fundamental problem.

The Secretary for Mines said that the mining industry was going ahead with production, and he emphasized the urgency of saving during the war—and starting from to-day—from 10,000,000 to 20,000,000 tons of coal a year by the more efficient generation and use of heat and power in existing industrial works throughout the United Kingdom. The Chairman of the Fuel Efficiency Committee of the Mines Department, Dr. E. S. Grumell, suggested that an economy target of 9,000,000 to 10,000,000 tons was reasonable of attainment, and he put it that 4,500,000 tons could be saved in generation processes, a further 4,500,000 in utilization, and something like 1,500,000 in the production and transport of coal. These figures are easy enough to write down on paper; they represent enormous quantities of our raw material. Fortunately we have vast resources of this raw material, and fortunately it is in a variety of qualities suited for specific purposes. We know, too, where these different qualities are to be found, and to some approximation in what amount.

The problem of economy in coal divides itself into phases. From the war angle, as, indeed, from the peacetime angle, the basic consideration is adequate production of the necessary varieties of coal and efficient distribution to the various centres of use, whether or not this use is direct or indirect. Gas undertakings, for the economic use of coal, need the delivery of specified quantities of coal of specific qualities. Uniformity of supply of other grades of coal is equally essential to the economic use of coal in the generation of electricity. We think that both these industries know how to use to the best advantage the coals supplied to them. If they receive unsuitable coals they will obviously obtain inferior results. Uniformity of supply is unquestionably the first consideration as far as the economic production of gas and electricity is concerned—that is, of course, constancy of supply of coals of the requisite quality. To maintain output in gaseous therms a gas undertaking may have to use a far greater tonnage of inferior coals than of suitable coals—in fact, has to use this greater tonnage. The same applies to electricity generation. This increased tonnage has to be mined, brought to the surface, handled, and transported. It has to be treated in plants of a costly nature difficult to replace. Very great expense and labour are involved. Inferior coals contain a large percentage of foreign inert material which has to be handled and transported to gas-works, where further handing takes place. The inert material appears in the coke supplied to industrial plants engaged on war production. For a given result, more of this coke has to be used—and very likely it is of such a nature that its very use entails further difficulty and it must mean more labour. The inert material is handled or transported about half-a-dozen times. In brief, we cannot see how substantial economy in coal can be effected in gas and electricity production.

Colliery engines account for a consumption of over 12 million tons of coal a year. We think that economies might well be effected in this direction. General industrial plants in 1937 accounted for a tonnage of about 70 million tons. We are sure that economies could be effected here. The fact is that industrial managements are not "fuel conscious." Generally speaking, in ordinary times the fuel bill represents only a small proportion of total manufacturing costs, and with ample supplies of coal economy in its use has not been stressed. Again speaking generally, little or no encouragement has been given to the fuel technician and boiler plants have been run at a low thermal efficiency. There has been quite inadequate attention paid to draught regulation, to the working of economizers, and to stoking. To-day the efficiency of innumerable boiler plants could be increased by the installation of new ancillary equipment—but that equipment is difficult to come by, and coal wastage continues. Nor in this respect has the natural enthusiasm for production and still more production in wartime helped matters. Economy in fuel has been allowed to take a seat still further back in the theatre of production. So we think that in regard to the industrial use of raw coal considerable economies ought to be expected as a result of the present collaborative fuel economy drive. Certainly every practical step—such, for example, as attention to pipe lagging and so on—should be taken to economize in what we may term the coal-steam line. What we have said about extravagant coal usage is applicable to the industrial use of gas. Already the Directorate of Gas Supply has found unnecessary wastage of gas in many places. For example, instances have been brought to light where ten gas furnaces were on full blast when seven or even five would, if properly fed, have been capable of coping with the required production. Already millions of therms of gas have been saved.

We are left with the conclusions, then, that the mining industry should concentrate on the basic step of mining and distributing the types of coal needed for specific purposes, thereby saving in transport and making primarily possible the best economy in utilization; secondly, that managements of industrial plants should, as a matter of national importance of first magnitude, take keen interest in the efficient utilization of fuels and energy in their establishments and throughout their processes; and, thirdly, that the surest way to achieve these results and without loss of time lies in the closest collaboration between everybody concerned, and not least the fuel interests. Any amount of sound advice and information is available, and it should be put to immediate use. For which reasons we welcome most heartily the collaboration so evidently existing between the various senior engineering and technical bodies interested in

fuel and power, and the official recognition given to the value and potential value of their work. We know full well that the Gas Industry will do all it possibly can to further the Government's object in economizing in coal, in using coal to the best advantage in the most telling way.

RESEARCH AND INVESTIGATION

WE hope to deal more fully later with Institution Communications which either have been or are being published as blue-books covering the period 1940–41. At the moment we would refer to the Report of the Council of the Gas Research Board and to that of the Chairmen's Technical Committee, both of which, as was to be expected, reflect the incidence of war conditions, and both of which, considering the circumstances, indicate a large measure of activity in research and investigation of current problems. Inevitably the progress of the researches of the Board and the development of its general activities have been to an extent slowed down, but the general programme of investigations has been pursued under difficult conditions and full collaboration has been maintained with Government Departments, primarily, of course, in furtherance of the war effort. In regard to the Joint Research Committee of the Board and Leeds University the main subject of investigation has continued to be the production of town gas by the partial or complete gasification of coal in hydrogen under pressure, but owing to "wartime requirements of official secrecy" a detailed report of the work could not be published. At the outbreak of war laboratory experiments had reached a stage when it became desirable to transfer the work on to a larger scale, but circumstances arising from the war made it impossible to proceed with the large-scale experiments. Until recently there appeared no immediate prospect of any improvement in the position. However, it has now been arranged that the plant which was to have been installed at the Fuel Research Station for the investigation should be transferred to and erected at a more convenient site where the requisite facilities will be available. A Hydrogenation Sub-Committee has been appointed to deal with the problem. In the meantime the investigation of the catalytic synthesis of methane has been actively pursued, two semi-scale units of different design having been erected.

We would also call attention to the investigation by the Board (in collaboration with the Fuel Research Board and the British Coal Utilization Research Association) involving the production at selected gas-works of trial batches of reactive coke for portable gas producers for road vehicles. It has confirmed that cokes having sufficient reactivity to be suitable as fuel for portable gas producers can be made from a variety of coals in commercial gas retorts. The production of reactive coke for the domestic open grate has also been under consideration, and it has been shown that it is not necessary, in order to prepare alkali-activated coke, to mix the alkali with the coal before carbonizing; coke can be activated by impregnation after leaving the retort. To obtain the most reactive coke it is necessary to select from within a specified range the class of coal carbonized and to carbonize it under controlled conditions in continuous vertical retorts. In another direction interest has been taken in the question of the alteration of the properties of coal tars by admixture of lime and the possible application of such tar-lime mixtures for various purposes. Actually we called attention to this process, which is due to Mr. H. J. Hodsman, of Leeds University, in the "JOURNAL" four years ago. It would appear that when heated moist tar is treated with lime there are formed lime salts intimately dispersed throughout the tar so that its viscosity may be greatly increased. The tar no longer behaves as a perfect fluid; it acquires an appreciable rigidity which enables the cold tar to be stored, transported, and applied to stone and other materials in ways not possible with normal tar. We are glad that the possibilities of the process are receiving consideration by the Gas Research Board.

A similar story of curtailment of activities but of sustained collaboration with Government Departments is to be found in the report of the Chairmen's Technical Committee. Actually, most of the work has found expression in the form of confidential memoranda.

Personal

After 42 years' service Mr. FRANK LUKE has resigned as Secretary of the Worksop Gas Company. He will be succeeded by Mr. Kenneth Wildin, Auditor to the Worksop Corporation.

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Mr. GEORGE MCNEICE, Assistant Manager, Lisburn Gas-Works, has been appointed Manager of the Undertaking in succession to Mr. A. S. Brooks.

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His many friends in the Industry will be sorry to hear of the serious illness of Mr. JOHN GREEN, Engineer and Managing Director of the Wisbech Lighting Company. Mr. Green underwent a serious operation in the North Cambs. Hospital at Wisbech on Dec. 27, and although for a time his condition caused great anxiety, he is now making steady improvement.

* * *

At a meeting of the employees of the Mid-Kent Gaslight & Coke Company on Friday, Dec. 19, 1941, Mr. W. A. Barnett, M.B.E., Engineer and Manager of the Company, presented on behalf of the employees of the Company a handsome chiming clock and electric torch to Mr. ALEC FIELD, the Assistant Engineer to the Company, on his leaving to take up his appointment as Engineer and Manager to the Penrith Corporation Gas Department. Mrs. Field was also the recipient of a neat handbag.

Obituary

The death has taken place at Morpeth of Mr. R. C. OLIVER, who was Chairman of the old Morpeth Gas Company. He was a Director of the Company for 37 years and in March, 1935, became Chairman. His service as Chairman ceased in 1940 when the Company was merged with the Newcastle-on-Tyne and Gateshead Gas Company. Mr. Oliver was formerly a member of Morpeth Town Council and was Mayor in 1904–5. He had been a J.P. for 35 years.

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Mr. HARRY G. KEILLOR, Manager of the Buckie Gas Company, died in a Glasgow Nursing Home after a short illness on Jan. 6, at the age of 29. Mr. Keillor had been Manager at Buckie for over three years and was previously Technical Assistant with the Corporation of Hamilton Gas Department.

* * *

J. A. Morris

I hope that permission may be accorded me to offer through the columns of the "JOURNAL" a tribute to my almost life-long friend, Mr. Morris, whose passing severs another link with the past. Such severances are in the natural order of things, and cannot be prevented; what has been in our power to control is the character of the memories that are to remain with those left behind. Had the roles been reversed, and had it been Morris's lot to pen these lines with me as the subject, would he have been able to voice precisely the same sentiments as fill my mind with regard to him? Exchanges are frequently not equal; and even in friendship there is apt to be a difference between what is given and what is received. It may well be that a notable lack of self-assertion—indeed a quite exceptional readiness to defer to the wishes of another—on his part made me the gainer by the exchange of our friendship, through enabling him to give something more than he got from me. Looking back, it seems that other things, too, must have increased my indebtedness; for memories are untinged by anything of a "sombre hue."

In the quite early part of our half-century or so of service, Morris and I shared a room separated by a staircase from the major activities of the "JOURNAL" in Bolt Court, a circumstance which necessarily caused us to become intimately associated in thought, word, and deed; and neither at that time nor during later years, when our work lay in separate departments of the business, did there occur a single instance of real disagreement between us. He was human—had he been more or less than human, our friendship would not have survived the test of so long a time—but any failings that this may imply were not such as to affect his sterling worth. He always possessed a "straight-line" mind, and he must have counted himself extremely fortunate in having been able to devote himself, under pleasing conditions, and amid appreciative colleagues, to a "straight-line" business. My feeling for him will remain, as it has always been, one of affection, stimulated by sincere gratefulness—for many things.

A. H.

James Bridge

News of the death of JAMES BRIDGE, the Engineer and Manager of the Elland Gas Company, has been received with deep regret by his wide circle of friends both within and outside the Gas Industry.

A recital of the number of Professional Committees upon which he served, or a glance at the list of the organizations represented at the funeral, gives but a slight indication of the love and esteem in which he was held.

During the whole of his business career he gave of his conscientious and courteous best, and much of his leisure time he gave to the service of others, and particularly to the education and training of juniors entering his profession.

For seven years he acted as Secretary of the Manchester District Junior Gas Association, and he was Secretary of the Senior Association from 1929 to 1937; and there are many whose success can be traced to the advice and assistance so freely given by our late friend.

A demon for detail work, and a keen and upright negotiator, James Bridge made a host of friends, but never an enemy. His example and influence for good can never die; and while his death has left us all much the poorer for his passing, we are thankful to have had the privilege of working—and playing—with him over a long number of happy years.

To Mrs. Bridge and family, the Gas Industry extends its sincere sympathy.

G. D.

Letters to the Editor

Domestic Water Heating

DEAR SIR,—I have read with interest the treatise on Domestic Water Heating by Mr. Leopold Friedman in the "JOURNAL" of Dec. 3 and the reply by Mr. F. Brooks in your issue of Dec. 17. The matter appears to be one of doctors disagreeing, but I would like to add a few comments on the supply of hot water to middle class and working class houses—including the million or more council houses built since the previous world war—from the housewife's point of view.

I do not think that business men and highly trained technicians can, for one moment, place themselves in the position of the ordinary housewife. You have to live this life to be familiar with all the various daily happenings inside the home, and the business man's ideal, however well-meaning, is rudely upset by illness and additions to the family. More often than not theoretically perfect installations can be found wanting in practice. Now that more women are employed in the Gas Industry I feel that it is a great opportunity for them to join in in these suggestions.

The sink, after the cooker, is the most important fitting in the house. Mr. Friedman suggests that water at about 110°F. is sufficiently hot. This, to my mind, is useless. On hygienic grounds a temperature of 160°F. should always be obtainable. Mutton fat deposited on plates and dishes cannot be removed by warm water, as every woman, or man for that matter, should know. Therefore an appliance must be provided capable of giving an adequate supply of scalding water. Failing this, a kettle must be heated on the hotplate of the cooker, or on a ring.

At any time of the day or night it is essential to have a ready means of producing a small amount of scalding or boiling water. If this service can be given only by means of the extravagant multipoint or the circulator (which would be extravagant also if worked at a continuous high temperature), then the gas ring is the only suitable means. The other means would fall under the heading of luxuries.

The domestic boiler is not sufficient for this purpose alone. Even if it did deliver scalding water at any moment—and it does not—it is generally out of use during the summer months, and its place has to be taken by a circulator to supply the demands for bath, clothes washing, &c. In doctors' surgeries the sink geyser is still frequently found, and in my opinion it is the best fitment for the sink. The small storage heater is very good for regular habits, but when extra demands come along it fails.

For the bath, if a solid fuel boiler is fitted, or a modern range boiler, this is all that can be desired in the winter months; but then comes the summer problem, and we fall back to the circulator, which means duplication and expense. This is not very satisfactory from the financial point of view, unless the appliance is fitted by the landlord. The bath geyser is probably the most useful appliance for the summer as a substitute for the kitchen boiler; but if this is a two-point appliance then we are not getting sink water the cheapest way.

The average small house in a country district requires a simple system of all-the-year-round hot or boiling water supply. Can this be economically given by the methods suggested by the two authors? We must not overlook the fact that kerosene plays a large part in cooking and water heating in the type of house I am considering. The reason is one of finance, for no one enjoys the mess and smell of kerosene if the appliances are not attended with the greatest care. The all-gas or all-electric home simply does not exist.

Up to the present full use has not been made of the advantages offered by gas and electricity for service in the ordinary home. The coal fire persists, and the several improved coal and other solid fuel cooking stoves have made great progress, in addition to oil. The solution of the problem would seem to be to supply gas on the tariff system. Gas is dear in the country remote from the pits, and this would seem the only reason why it is not fully used.

How is gas going to provide the needs of to-day and those of the post-war era in the most economical manner for the large class of homes under consideration? Under tariff operation I would suggest the following scheme for domestic water heating. For the sink, an instantaneous water heater of the pressure operated type capable of delivering scalding water always, and boiling when required, only where the water supply system is suitable and reliable. Where the pressure is irregular, whatever the cause, the sink geyser should be fitted. For the bath and tap used to draw water in bulk, a multipoint in bathroom or circulator in kitchen could be used, and also the well-established high-capacity storage heater should be considered in place of the other two systems—this to be capable of providing water for at least two good baths in quick succession.

We should then dispose of the solid fuel boiler so often used as a space heater in winter months. Some other form of heating would, however, be required in its place, such as a gas fire or radiator.

Southminster Gas Company. Yours faithfully,
Dec. 24, 1941. ROSEMARY HEBDEN.

Maintenance of Equipment

SIR,—A meeting was recently held in London between representatives of the Government Departments concerned, the users, including owners of hire fleets, and the manufacturers of contractors' plant. One of the principal items discussed was the matter of a prompt and adequate supply of spare parts.

As manufacturers of plant engaged all over the Empire on work of vital importance, it is natural that we have given this subject much thought, particularly as the greatly increased number of machines at work has rendered the question increasingly important. Our representative at this meeting stressed a fact which has always been patent to us, but which in the present situation has grown from a matter of mere domestic concern to one of genuine national importance.

It is agreed by everyone that the conservation of materials and labour is now a matter of urgency, but it is not always realized that the difference in spare parts demands and machine stoppages between a machine which has been regularly and adequately lubricated, and which has had the engine oil changed at frequent intervals, compared with a machine which has been neglected in this respect, is enormous.

In normal times, while it is important to attend to the maintenance of equipment, it is a matter which is important only to the contractor immediately concerned, and neglect will only react on himself. Furthermore, the general average of skill of the drivers and mechanics employed on contractors' plant in pre-war days was appreciably higher than it is to-day, and the owner of a machine could therefore reasonably expect to leave the matter of maintenance to their discretion then than now.

To-day machines are working very long hours, often under very adverse conditions, and largely in the hands of unskilled drivers. It is therefore essential that both drivers and mechanics should be given the strictest instructions as to the maintenance programme they are to follow. The present state of war has made every man's business also that of his neighbour, and where raw materials are concerned, and spare parts in particular, it is of the utmost importance to take advantage of every possible means of cutting down the demands.

Every item of contractors' plant when delivered is accompanied by the manufacturers' recommendations on this all-important subject of lubrication, and if operators would carry out these recommendations fully, the demand on spare parts could be cut down to a minimum and the time lost on breakdowns correspondingly reduced.

Muir-Hill dumpers are everywhere engaged on work of vital importance at the present time, and every hour lost through breakdowns, every spare part demanded as a result of neglect, is a drain on resources which we are doing all in our power to conserve. Additional lubrication charts and instructions are available on request, and we should be happy to advise in any instances where machines are engaged on particularly onerous work.

Another point of importance, on which the most definite instructions should be given to all drivers, is the necessity, so long as the danger of frost exists, of draining the water every night from the engines of all machines left in the open or in unheated garages. A cracked cylinder block to-day is more than a mere matter of annoyance and expense. It is an unnecessary drain on the national resources.

Yours faithfully,
Old Trafford, E. BOYDELL & CO., LTD.,
Manchester 16. E. BOYDELL,
Dec. 16, 1941. Managing Director.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Economy in Use of Fuel

On Thursday last, Jan. 8, a meeting of a series arranged at the request of the Mines Department to discuss the best ways and means of improving the efficient use of fuel and power in existing industrial plants under present conditions was held at the Institution of Electrical Engineers. Previous meetings have been held in Bristol and Manchester and the series has been arranged by ten of the leading technical bodies—The Institute of Fuel, The Institution of Gas Engineers, the Institution of Chemical Engineers, the Institute of Chemistry, the Society of Chemical Industry, the Iron and Steel Institute, the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Mining Engineers, and the Institution of Electrical Engineers.

Prior to the meeting a luncheon was held at the Waldorf Hotel, when Mr. D. R. Grenfell, Secretary for Mines, welcomed a large gathering and explained the purpose of the meetings. He asked that the various organizations represented—and he was cognizant of the good services of these organizations individually—should co-operate in the all-important aim of using coal more efficiently. The mining industry was going ahead in the matter of production, but there was great need for conserving this production, and that was where those present could lend their aid.

In opening the meeting, at which Sir Harold Hartley, Chairman of the Fuel Research Board, presided, Mr. Grenfell said there was available a fund of knowledge on the efficient utilization of fuel; the aim was to apply this knowledge to the best advantage. There were faults to remedy and much good could come as the result of constructive criticism, which he invited. He thought that the calling of the meeting showed greater official recognition than had been shown before of the importance to the nation of the fuel interests. It must be a consolation to the country that, for its size, it had the richest source of crude fuel, and that the coal was there in a variety of qualities. He thought that in the past they had priced coal too cheaply on the basis of volume rather than having regard to its potential value. The immediate point was that the war effort depended on the best use of coal, and immediate results were required. He looked for a saving of at least 1% in the next six months, working up to 5% before long; and he had complete confidence that this could and would be achieved.

Sir Harold Hartley said it was encouraging that ten senior engineering and technical institutions had gathered together in that way, and referred to the results that accrued from economy drives of the nature in the last War. Between 1913 and 1938 population increased by 10%; the use of power and heat in manufacturing processes was widely extended; many new industries came into being and domestic requirements for light, heat, and power were increased. All this took place with an additional consumption of fuel of only 4%, owing to the great advance in fuel economy during that period. Now the problem of making the best use of existing coal supplies was one of urgency, and it was a time for the making of quick adjustments.

Dr. E. S. Grumell, Chairman of the Fuel Efficiency Committee of the Mines Department, suggested that an economy target of 9,000,000 to 10,000,000 tons of coal appeared reasonable of attainment. He thought that 2½%, or 4,500,000 tons could be saved in generation processes, and a further 4,500,000 tons in utilization. Then he thought that 1,500,000 tons could be saved in the production and transport of coal. In general, managements showed lack of interest in fuel utilization, and very few of the larger concerns carried fuel experts on their staffs. Economies could be made by increasing the number of fuel engineers attached to district coal offices, by making people more fuel conscious, and by co-operation and education in making the fullest use of coal.

Mr. J. G. Bennett (Director of the British Coal Utilization Research Association) thought that the problem resolved itself into four parts. There was the broad question of output in relationship to demand, the unbalancing of requirements according to different grades and qualities, difficulties imposed by geographical situation, and temporary shortages as a result of interruptions in the flow of coal. These demanded from the consumer an adaptability which would not have to be exercised under ordinary conditions. In his view the saving of fuel was largely a matter of administrative support of the technical man; and he appealed to managements to extend this support.

Mr. E. C. Evans (Director of Research at the British Iron and Steel Federation) urged the greater use of measurement and unit control and spoke of the need of some degree of uniformity of the coal supplies for particular purposes. Efficiency could not be expected if the supply of coal for a particular purpose at one moment contained 31% of volatile matter and the next moment was pure anthracite.

Mr. J. F. Ronca (Gas Administration Department, Board of Trade), who expressed regret that the Director-General of Gas Supply, Dr. E. W. Smith, could not be there to speak, remarked that not only were there difficulties in getting adequate coal output from the pits and in transport, but a far greater use was being made of gas than before the war. Normally a gas undertaking worked upon a plant capacity 20% in excess of existing demand, but now undertakings were experiencing increased demands amounting to 100% or more in excess of pre-war consumption. Gas-producing plant was not built in a day, and it was felt that the only way of obtaining some immediate relief of the situation was for the consumer to effect economy by preventing sheer waste. The Directorate of Gas Supply had in many instances found such waste taking place—instances where, for example, ten gas furnaces were on full blast when seven or even five would, if properly fed, have been capable of dealing with production. Such was this wastage that they had recommended the appointment of "gas chasers"—men to visit works and encourage economy in gas usage. It was up to the administrative end of businesses to take steps to effect economy in this direction.

British Gas Federation

A Meeting of the Council of the British Gas Federation was held at Gas Industry House, 1, Grosvenor Place, London, S.W. 1, on Tuesday, Dec. 9, 1941. Sir David Milne-Watson, Bart., LL.D., D.L., presided.

Post-War Planning Committee.—It was reported that the National Gas Council had set up a Post-War Planning Committee representative of the National Bodies and that three meetings had already been held. A resolution was submitted by the Central Executive Board of the National Gas Council proposing that this Committee should now become a Committee of the Federation. It was unanimously agreed to adopt the Post-War Planning Committee as a Committee of the Federation with their existing terms of reference.

National Smoke Abatement Society.—The Committee considered the recent appeal made for financial support of the Society and decided to recommend the continued support of this Society, both by the National Bodies and by gas undertakings throughout the country.

Annual General Meeting.—It was unanimously decided that, in view of the circumstances prevailing, the Annual Meeting of the Federation should be postponed.

A list of the Council representatives for the year commencing Jan. 1, 1942, was submitted and approved as follows:

Representing National Gas Council.—Sir David Milne-Watson, Bart., Wm. Cash, C. S. Shapley, A. W. Smith, J. R. Bradshaw.

Representing British Commercial Gas Association.—Col. F. J. Bywater, Alderman E. Grimsby, J. Jamieson, W. J. Sandeman, D. Fulton.

Representing Institution of Gas Engineers.—George Dixon, R. Robertson, E. V. Evans, J. Jamieson,* Sir Frederick J. West.

Representing Gas Companies' Protection Association.—C. M. D. Belton, H. E. Bloor, Chas. E. Botley, F. G. Brewer, R. Halkett.

Representing Society of British Gas Industries.—C. G. Langford, F. B. Richards, R. J. Rogers, Ernest West, Col. O. B. F. Planck.

The following members have been co-opted : T. Hardie, J. Terrace.

* Since replaced by Col. H. C. Smith, Mr. J. Jamieson being already a representative of the British Commercial Gas Association.

Ministry of Food Information Boards

[CONTRIBUTED]

The Ministry of Food Information Board Scheme devised in collaboration with the British Commercial Gas Association and the Electrical Development Association has been taken up by 299 gas undertakings, with 461 boards on display, throughout the country. While 299 undertakings showing 461 boards is an encouraging figure, it by no means represents the total number of undertakings which are in a position to play their part in this great national food educational effort.

There are numerous ways in which ingenuity can be brought to bear on the job of making the board attractive. For instance, deputize a member of your own staff (shorthand writer) to listen in each morning to the 8.15 a.m. "Kitchen Front" broadcast, and make brief but careful notes of items of special news value, or an attractive recipe dealing with dishes prepared from unrationed foods.

The most interesting items would be typed and displayed on the Information Board immediately the showroom opened. A suggested heading for this broadcast sheet might read as follows: "Special Service"—latest news from to-day's "Kitchen Front" broadcast.

Press cuttings from London and local newspapers dealing with food matters could be displayed to advantage.

The greatest tribute paid to the Ministry of Food Information Boards comes from the large number of engineers and managers who have written in saying how much these boards are read and appreciated by their consumers and others who visit or pass by their showroom windows.

Before the war the showroom windows of the Gas Industry maintained an extremely high standard of displays and examples of the display-man's graft. These windows were not only designed with the object of developing and increasing the sales of appliances, but, something of infinitely greater importance, they aimed at the creation of goodwill. To-day sales and sales promotion have had to take a back seat, but goodwill and service have taken on a new significance and meaning. Goodwill can only be built up by loyal, steadfast, and unfailing service to the consumer, and the Ministry of Food Information Board Scheme offers a grand opportunity of providing not only a service to consumers, but a vital service to the country.

A Contract for the supply to Glasgow of coke oven gas was approved by Glasgow Corporation on Jan. 8. The arrangement is that the city will receive surplus production from blast furnaces amounting to 2,500,000 cu.ft. per day during the week, and a slightly larger quantity at the week-end. It is stated that the supply may be increased to 4,000,000 cu.ft. per day.

STANDARDS OF CALORIFIC VALUE FOR GAS

By Dr. G. E. FOXWELL

THE technical position in the Gas Industry is highly interesting to-day. More new ideas are being discussed than ever before in its history. The problem of whether to manufacture coke and gas as in the past or whether to concentrate upon gas only is becoming of some practical importance, whereas until lately it was largely theoretical. The post-war reorganization of the Industry will be under Government supervision, and what is done will be given the force of Government sanction. It is therefore necessary that any recommendation made should be such as will cause no regrets at a later date. This applies to the recommendations of the committees of The Institution of Gas Engineers, and perhaps particularly to that concerned with the standardization of C.V.

It is of interest to ask whether the minimum permissible declared C.V. should be 400 B.Th.U. or whether lower figures should be permitted. While the writer is firmly of the opinion that a combination of gas and coke presents greater advantages under the conditions now prevailing, the possibility that a total gasification process will become desirable at a later date or under special local conditions cannot be ignored. Carburetting gas to increase the C.V. adds to the cost of manufacture and is to be deprecated on that account. It is desirable to visualize a total gasification process and what are the arguments for and against? Is low C.V. gas equal or inferior to high C.V. gas? Under what conditions can a total gasification process operate?

The common thread binding together all proposals must be economics. Whatever the future of the Gas Industry, its essential work must continue to be the processing of coal to produce fuel in a form and at a price at which it is required and can be used alike by the nation, industry, and domestic consumers. Whether that form will be gas only or gas with coke remains to be seen. The basic fact in the writer's opinion is that to-day gas and coke are complementary smokeless fuels, which when used together enable the products of the Gas Industry to be utilized to supply the whole heat required for even small houses occupied by those of small incomes. The all-gas house complement cannot yet be generally applied to these small houses.

The economics of fuel consumption must have an important bearing upon the policy of the Industry. Some five years ago Mr. Seebohm Rowntree made a survey of the City of York in which he classified the population according to its income levels. At that time he found that if a family of five were to earn enough to buy food just sufficient for physical efficiency and decent clothing, and to provide just adequate heat and light for the home, household sundries, trade union and sick club subscriptions, and—assuming the expense was very careful—leaving about 5s. a week for every extra, the budget would require 43s. 6d. a week after paying rent. No less than 38% of the wage-earning population was below this level. We are therefore faced with the fact that in normal times some 40% of the population is seriously affected by an additional expenditure of even 1s. a week. Some 80 or 85% of the population earn less than £5 a week in normal times, and another 40% of our potential consumers must be disinclined to increase their expenditure on fuel.

The cost of gas production, distribution, and utilization must therefore have a most important bearing on any proposals that are made in respect of the technical processes or the business organization of the Industry. These several processes cannot be dissociated one from the other. It may be found possible to produce gas more cheaply at the works by the use of a lower calorific value. This may, in turn, increase distribution costs. It has been claimed that the efficiency of utilization of low C.V. gas is greater than that of high C.V. gas. In any proposal involving new methods or standards the criterion must be the cost to the consumer of doing a given service on his house.

A view of the future development of the Gas Industry taken by an independent fuel expert is that of Mr. W. M. Selvey in his recent Presidential Address to the Institute of Fuel. Mr. Selvey clearly believes that gaseous fuel will in time replace solid fuel. In the future, he says, "we shall see great developments in the way of total gasification and distribution of medium instead of high calorific gas. . . . The distribution of medium calorific gas would, of course, mean a network of mains at high pressure, but this is a development which is already coming about for other reasons." He pointed out that although the change-over in gaseous fuels would probably mean a higher price per therm, this very reason would lead to greater economy in use, a development which would come about by the conscious improvement of appliances and methods of utilization.

It is recognized that the calorific value of gas *per se* is not a matter of any great moment. The "GAS JOURNAL" gave expression to this view in its Editorial Notes of Oct. 29, 1941: "The greater the thermal output of gas from a ton of coal, the greater its volume and the lower its calorific value; but provided the consumer gets the necessary heat required—we are thinking of the domestic consumer—he has no need to be concerned with calorific value. Drastic alteration in calorific value would entail a good deal of adjustment of appliances, but, granted this adjustment, one B.Th.U. is, within reasonable limits, as good as another for the simpler domestic gas-using apparatus. But, as we have said, the heat must be delivered at the burner, and this involves the carrying capacity of the distribution system. The capacity of the mains imposes a limit on calorific reduction."

The reference in the foregoing passage to the carrying capacity of the distribution system coupled with Mr. Selvey's reference to the distribution of gas of medium calorific value suggested to the writer that some calculations might be made upon the effect of changing from the present general standard of 500 B.Th.U. to a lower standard which would enable gas to be made by total gasification.

The first criterion must obviously be the suitability of a gas for the purpose for which it is to be used. Gas of low calorific value can be used for very many purposes, and it is surprising how low the calorific value may fall without any deleterious effects being experienced. Any gas having a normally low content of inerts (of the order of 5%) and a calorific value down to that of blue water gas (290–300 B.Th.U. gross) can be efficiently utilized for town purposes.

Methods of Total Gasification

The possible methods by which gases can be manufactured without enrichment by a total gasification process are three: (*a*) The process now being investigated at Leeds University by The Institution of Gas Engineers producing high C.V. gas. There has been no suggestion that this method will enable cheap gas to be manufactured, and the appearances, so far as published information is concerned, are all against any decrease in cost of manufacture; the indications would, indeed, appear to be quite in the opposite direction. The method has not advanced beyond the laboratory stage as yet, and it will obviously be some years before the detailed results of even a semi-scale process will be available. (*b*) Carbonization of the coal by any existing process coupled with subsequent production of blue water gas from the coke. An example of this would be the production of gas of, say, 475 B.Th.U. in continuous vertical retorts and the gasification of the coke in a separate blue water gas set. (*c*) Processes by which the coal is carbonized and the coke is gasified (generally in the same apparatus) by an air-steam mixture. Method (*c*) has the disadvantage of producing a gas containing a high proportion of inerts and therefore having a lower flame temperature than the standard gases now used. For most purposes this would not be deleterious, and it is claimed that these processes produce gas more cheaply than existing processes. It is also claimed that inerts in gas have a beneficial effect in promoting heat transfer.

Method (*b*) is generally applicable to-day with existing plants if a blue water gas set is added. Method (*a*), even if it proves to be commercially feasible, appears only suitable for large works capable of operating complicated chemical processes. If method (*a*) is adopted by large works it would seem that room must be left for a total gasification process, such as method (*b*), which can be applied by smaller undertakings.

It can be calculated that the distribution of gas made by this process would be covered if a declared calorific value of 350 B.Th.U. per cu.ft. gross was permitted. This will therefore be the value taken for this enquiry.

Relative Cost of 350 and 500 C.V. Gas

Coal carbonized in continuous verticals may be considered as an example to yield per ton 18,650 cu.ft. of 477 B.Th.U. gas, and if benzole was extracted from this there would be obtained some 18,500 cu.ft. of 455 B.Th.U. gas. If the coke available for the manufacture of water gas amounts to 10 cwt. per ton, at 40 lb. of coke per 1,000 cu.ft. of gas there would be produced 28,000 cu.ft. of 295 B.Th.U. water gas, leading to the production by the whole process of 46,500 cu.ft. of 358 B.Th.U. gas, or 167 therms per ton of coal.

To calculate the cost of production of this gas is somewhat meaningless because it depends so much upon the local conditions, and to a considerable extent also upon the size of the plant; an example will, however, make it clear that the economics of the proposal depend upon the coke market.

In the following calculation, which relates to large plants, the cost of maintenance, salaries, and purification has been neglected. No credit has been allowed for surplus steam nor has a charge been made for steam used. For carbonizing plant, the cost of labour and capital has been taken from Table I, case C, of F. B. Richards' Paper (1934), "Perspective in Carbonizing Costs." For B.W.G. figures supplied privately relating to an equally large installation have been used. In all the calculations the data taken are:

Coal . . .	30s. a ton.
Tar . . .	3d. a gallon.
Benzole . .	4d. a gallon (net).
Coke yield .	10 cwt. of saleable coke which can be used in the water gas plant.
Thermal yield by carbonization	84 therms/ton coal.
" by B.W.G. plant	83 therms/10 cwt. coke.

CASE 1.—Coke at 35s. a ton.

Carbonizing:

	s.		s.		d./therm.
Coal—1 ton	—		30		—
Coke—10 cwt.	17.50		—		—
Tar—13 gall.	3.25		—		—
Benzole—2½ gall.	1.87		22.62		—
Net coal cost			7.38		1.054
Labour					0.129
Capital					0.374
		Cost per therm			1.557

B.W.G.:

Coke—10 cwt.	17.5			2.253
Labour				0.048
Capital				0.257
	Cost per therm			2.558

CASE 2.—Coke at 25s. a ton.

Carbonizing:

	s.		s.		d./therm.
Coal—1 ton	—		30		—
Coke—10 cwt.	12.50		—		—
Tar—13 gall.	3.25		—		—
Benzole—2½ gall.	1.87		17.62		—
Net coal cost			12.38		1.790
Labour					0.129
Capital					0.374
		Cost per therm			2.293

B.W.G.:

Coke—10 cwt.	12.5			1.810
Labour				0.070
Capital				0.300
	Cost per therm			2.180

From this it becomes clear that, on the basis of these values, if the price of coke at works per ton is less than about 90% of the cost of coal at works per ton, an unfavourable coke position can be rectified by employing this dual gasification process and producing gas of 350 B.Th.U. If the price of coke is greater than this total gasification would only be justified if a substantially cheaper process was available than a combination of carbonizing plant with blue water gas generator. The limiting value of 90% will vary according to the yield and price of by-products. It will also depend on the size of the plant, since the relative costs of vertical retort gas and B.W.G. must depend on this to some extent. The figures here given are only to be regarded as an example and must be modified to suit individual conditions.

Distribution Costs

The problem of distributing the lower grade gas is the greatest stumbling block in the minds of most gas engineers. For every 1,000 cu.ft. of 500 C.V. gas that is sent out, 1,425 cu.ft. of 350 gas must be distributed and it is concluded that the size of the mains will be insufficient.

An analysis of the pressures required and of the capacity of existing mains is an instructive method of attacking this problem. The writer recollects instances, one in particular relating to a large gas company, in which mains that were designed for a certain quantity of gas were found to carry far more gas than this without any difficulty. This suggests that the capacity of gas mains is not always known. It may be that this uncertainty has arisen by reason of the general use of Pole's formula for calculating the flow of gas in mains. This formula, $Q = 1{,}350\sqrt{pd^5/sl}$ is derived from the earlier Chezey formula $Q = 188\sqrt{pd^5/3\zeta sl}$ where ζ is the coefficient of friction. In this formula—

p = pressure drop in inches W.G.
d = internal diameter of pipe, inches.
s = specific gravity of gas (air = 1).
l = length of pipe in yards.
Q = volume of gas in cu.ft. per hour at 60°F. and 30 in. bar.

Pole's formula assumes that the coefficient of friction is constant and equals 0.0065. Actually this is the value for a 4-in. pipe and the real value of the coefficient depends upon the size of the pipe, as has been pointed out by Mr. Stephen Lacey. For this reason the flow of gas in low pressure mains is more accurately given by other formulæ taking this into account. We here use what is variously known as the Chicago or Spitzglass formula:

$$Q = 3550\left(\frac{d^5}{1 + 3.6/d. + 0.03d.}\right)^{\frac{1}{2}}\left(\frac{p}{3sl}\right)^{\frac{1}{2}}$$

which takes into account the changing value of ζ with changing diameters of the pipe. As an example of the difference caused by changing the formula it is interesting to calculate the quantity of gas that can be transmitted by a 10-in. main of a length of 10,000 yards and with a pressure drop of 3 in. W.G. By Pole's formula the quantity is 11,000 cu.ft. per hour, whereas by the Spitzglass formula it is 13,000 cu.ft. per hour. It thus appears that the real capacity of a main may be greater than the capacity which has hitherto been assigned to it. In these circumstances the change over from high grade gas to low grade gas will be more easily effected. If, for example, this same main had been calculated by Pole's formula to take 11,000 cu.ft. of gas under the conditions stated, with a change from 500 C.V. gas to 350 C.V., the new volume of 15,700 cu.ft. of gas would be carried by the same main with a pressure drop of no more than 5.1 in. instead of 7 in. calculated from Pole's formula. Obviously, before deciding that it is not feasible to make gas of a lower C.V. it is necessary to investigate the actual pressure drop in the mains, having first made sure that the mains are free from obstruction.

If the true capacity of a gas main is known the effect of changing to lower C.V. gas could be shown quite simply by applying the Spitzglass formula. In the instances just calculated 13,000 cu.ft. of gas can be taken through a 10-in. main having a length of 10,000 yards with a pressure drop of 3 in. W.G. If the quality of the gas supplied is changed to 350 B.Th.U. per cu.ft. the quantity to be transmitted is increased to 18,600 cu.ft. and its specific gravity increases from 0.45 to 0.52. In these circumstances the pressure drop along the main is increased to 7 in.

So long as this pressure can be supplied from the works without boosting no additional cost is entailed and there is no additional expense. As soon as it becomes necessary to install a booster the expense increases sharply. This additional expense is not an abnormal feature. Most gas undertakings have a district where the mains are too small and where a booster has been installed rather than lay new mains. Whether changes should be made from 500 gas to 350 gas involving the use of a booster depends entirely upon how far the cost of transmission will be increased.

The maximum allowable pressure drop along the main just referred to may be regarded as 8 in., and to take a numerical example it may be supposed that this main at peak load periods is already required to take a load of 500 C.V. gas just great enough to give this maximum allowable pressure drop. In these circumstances, calculating by the Spitzglass formula, the quantity of gas transmitted is 21,150 cu.ft. per hour.

When changing to 350 C.V. gas the quantity that it is required to transmit will be 30,200 cu.ft. per hour, and the pressure drop can be calculated as being 18.8 in. W.G. In order to deliver gas at 6 in. at the far end of the main it is thus necessary to compress the gas to 24.8 in. pressure, or 0.78 lb. gauge pressure. The horse-power required for doing this is negligible, amounting to only 0.12 h.p. per 1,000 cu.ft. per hour, costing 0.043d. per 1,000 cu.ft. The capital cost of the boosting plant, however, is more important.

Before giving this figure the basis of the determination of costs must be stated. To-day's prices for power, compressors, and mains are artificial, and the prices are therefore based on pre-war values. The capital cost for compressing plant is that given in Mr. Stephen Lacey's 1928 Paper before The Institution of Gas Engineers. The cost taken for mains, including laying, is that adopted by the Departmental Committee on Area Gas Supply. The same Committee's figure for power, of 0.36d. per h.p. hour, is also adopted in making this calculation. Any changes that may have occurred in these figures will affect the absolute values but will not invalidate the argument.

In the example just given it is to be recognized that the compressor would only be used for peak load periods, but that its capital cost must be spread over the whole of the gas carried by the main. In these circumstances it may be suggested that if the main carries 30,200 cu.ft. during the peak load periods the average carried per hour throughout the whole day may be 10,000 cu.ft. On this basis the cost of power, including the capital cost of compressors, over the whole of the gas carried by the main amounts to 0.31d. per 1,000 cu.ft. or 0.088d. per therm. Thus during the peak load the total additional cost of gas would be 0.100d. per therm and during the rest of the day it would be 0.088d. per therm.

The conclusion may thus be reached that for low pressure systems the increase in distribution costs incurred by changing from 500 B.Th.U. gas to 350 B.Th.U. gas would be negligible. It remains to consider what would be the position where gas has to be boosted over perhaps considerable distances. Where new mains are laid for the purpose it is possible to calculate the size of the main that will give the least possible cost. This figure is secured by adding together the cost of power, the capital cost of mains, and the capital cost of compressors for a number of different sizes of main, and thus finding by trial and error for which size of main the sum of these figures per 1,000 cu.ft. of gas is the minimum. Where the quantity of gas is comparatively small the capital cost of the main may be the deciding factor. Where the quantity of gas is larger, the cost of power may be decisive. The cost of the compressors does not greatly influence the total cost, but may make a slight difference to which size of main is to be preferred, since the capital cost of the compressors depends upon the horse-power required.

For the purpose of this calculation a gas will be considered as transmitted over a main 10 miles in length with a terminal gauge pressure of 1 lb. per sq. in. Considering first a moderate amount of gas of 500 therms per hour, assumed for the purpose of calculation to be transmitted at this rate 24 hours a day over the whole year, the following figures were obtained for the minimum size of main:

	500 C.V. gas.	350 C.V. gas.
Economic size of main	12 in.	12 in.
Initial gauge pressure, lb. per sq. in.	5.5	10.4
Capital cost of mains, £ per mile	£3,593	£3,593
Capital cost of compressor plant	£2,250	£3,500

Cost—d. per cu.ft.	d.	d.
Power	0.259	0.414
Mains	1.080	0.763
Compressors	0.093	0.101
	1.432	1.278
Cost per therm	0.286	0.365
Increased cost due to changing to 350 C.V. gas	0.079d. per therm.	

If, however, the quantity of gas is considerably greater, amounting to 3,500 therms per hour over the same distance, the figures obtained are as follows:

	500 C.V. gas.	350 C.V. gas.
Economic size of main	28 in.	32 in.
Initial gauge pressure, lb. per sq. in.	4.3	5.0
Capital cost of mains, £ per mile	11,500	14,542
Capital cost of compressor plant	5,400	7,400
Cost—d. per 1000 cu.ft.:	d.	d.
Power	0.191	0.234
Mains	0.497	0.440
Compressors	0.032	0.030
	0.720	0.704
Cost per therm	0.144	0.201
Increased cost due to changing to 350 C.V. gas	0.057d. per therm.	

It is also instructive to note the difference in cost where a works has a pressure main carrying less than its economic quantity of gas and is subsequently over-loaded to carry more than its economic quantity of gas. The next table gives an example of this. It is first supposed that a 15 in. trunk main is carrying 400 therms per hour over a distance of 10 miles; subsequently the quantity of gas is increased to 600 therms per hour in the same main.

	400 therms per hour.		600 therms per hour.	
C.V. of gas—B.Th.U./cu.ft.	500	350	500	350
Economic size of main	15 in.	15 in.	15 in.	15 in.
Initial gauge pressure, lb. per sq.in.	2.1	3.4	3.3	6
Capital cost of mains, £ per mile	£5,566	£5,566	£5,566	£5,566
Capital cost of compressor plant	£750	£1,300	£2,250	£2,250
Cost—d. per 1000 cu.ft.:	d.	d.	d.	d.
Power	0.098	0.153	0.155	0.198
Mains	2.100	1.470	1.400	0.980
Compressors	0.038	0.047	0.077	0.054
	2.236	1.670	1.632	1.232
Cost per therm	0.447	0.477	0.326	0.351
Increased cost due to changing to 350 C.V. gas	0.030		0.025	

In general it is to be noticed that by going down in calorific value the volume of the gas to be transmitted is increased. The power requirements are increased partly by the increased quantity of gas and partly by the fact that a somewhat higher pressure is needed. The cost of the mains, however, is spread over a larger quantity of gas so that where the mains are of the same size or not greatly increased the cost per 1,000 cu.ft. of gas will be decreased, although the cost per therm will, of course, be increased. In the same way the cost of compressors per 1,000 cu.ft. will usually be less for the low C.V. gas, although, again, more per therm.

Factors Detrimental to Lower C.V. Gas

The figures here put forward indicate that if the coke market becomes permanently unfavourable the increase in distribution costs resulting from a change in C.V. from 500 B.Th.U. to 350 B.Th.U. is insufficient to prevent the adoption of a total gasification process involving the production of 350 B.Th.U. gas. Other factors come into the problem, however, that reduce the attractiveness of the proposal.

The capital cost of making the change may be considerable. An increase in the volume of gas to be handled of over 40% may involve the installation of additional by-product plant, including condensers, exhausters, and purifiers. Gasholder capacity, always an expensive item in capital cost, may be reduced from a safe to a dangerously low fraction of the daily make. Where there is a large day-and-night industrial load the diminution in gasholder capacity will be of minor importance, but when the load fluctuates considerably over the day, this may be a very serious item. In a two-stage process there must be adequate mixing plant, even if the storage capacity need not be ample.

Unaccounted-for gas is a serious item in some undertakings, and although it is not wholly due to leakage, that fraction of the loss—whatever it may be—that is due to leakage will be increased by increased pressure. The effect of pressure will depend upon the nature of the leakage. If the leakage is due to holes in the main large enough to be termed orifices the discharged volume of gas varies as $\sqrt{h/s}$, where h is the pressure difference between the inside and outside of the pipe and s is the sp.gr. of the gas. Taking the example calculated earlier in this discussion, when for 500 gas, $h = 3$ in. W.G. and $s = 0.45$, the rate of leakage is 2.58 k, where k is a constant. When distributing 350 gas, $h = 7$ in. and $s = 0.52$, the rate is 3.66 k.

For smaller holes, where the thickness of the main is large compared with the diameter of the hole, the law is that of flow through a capillary. The rate of leakage then varies directly as the pressure difference between the two ends of the passage. For small holes, therefore, the change in C.V. will have a greater effect per hole, though this may not amount to very much in the mass since the amount passed by these small holes is small. If leakage is a serious item, the correct procedure is to overhaul the mains, but the change from 500 gas to 350 gas may well result in an overhaul being necessary that would not otherwise be required.

Quite frequently the size of the services creates a bottle-neck in supply so that a pressure that is considered sufficient to supply a new district may be totally inadequate for an older one with small service pipes. To renew the hundreds of these small services which exist is obviously a task that must be tackled by the Gas Industry in its own interests. These pipes were designed for gas lighting, not for gas heating, and their existence prevents the installation of gas fires, gas cookers, and so forth. The renewal, however, is an expensive matter, not lightly to be undertaken. It is no light matter to renew the services simultaneously over a considerable area; this might well be necessary were the C.V. of the gas reduced too drastically. These small mains probably exist only in certain towns where there is a lot of old property that was carcassed for gas early in the history of the Gas Industry, and it would not be a general difficulty. Where it occurs, however, it is sufficient to prevent a drastic decrease in the C.V.

Inequalities of pressure that may be set up constitute another factor. The resistance of the mains to the passage of greater quantities of gas must be taken into account. For a given final pressure the initial pressure is raised considerably. One method of overcoming this difficulty is to use a high-pressure main alongside the low-pressure main, feeding into it at intervals, or at the farther end. This, again, involves additional expenditure. The expenditure, when spread over the gas distributed, is very small, and would not increase the distribution costs appreciably. It is clear, however, that the change from 500 gas to 350 gas may be accompanied by considerable expenditure of capital. It is usually cheaper to organize the marketing of coke properly on the lines of the London and Counties Coke Association and so to convert coke from a handicap into an advantage.

Another objection to lowering the declared C.V. of gas has been stated to be the limitation placed upon the quantity of gas distributed. It is suggested that a total gasification process should only be adopted when there is an increased load such that the whole of the coke can be converted into gas without diminution of the quantity of coal carbonized. This appears to be a fallacy, for the object of total gasification is to avoid making solid fuel which is claimed to be riding into popularity on the back of gas, not bearing its full share of costs. Those who take this view would do away with coke, leaving the 160 or so therms of gas produced by total gasification to bear the whole of the charges. It is then claimed that by going down in declared C.V. the mains system is so overloaded that it can no longer carry the increased gas load that will result from the alleged cheapening of gas due to not having to sell coke. The whole argument appears fallacious. If, however, a total gasification process should be devised that would make gas so cheaply that the all-gas house could be adopted throughout the district, it would obviously pay to install additional mains, and those mains would be of an economic size, and thus would not result in noticeably increased distribution costs per therm.

Conclusions

The conclusions that may be drawn from this discussion appear briefly to be as follows:

(1) There are no physical or chemical characteristics in 350 B.Th.U. gas that make it inferior to 500 B.Th.U.

(2) The relative cost of production of coal gas and of mixed gas made in a two-stage process involving carbonization followed by gasification of the coke in a B.W.G. generator is such that when the coke market is so depressed that the price of coke per ton is a certain fraction (in the instance given about 90%) of the cost of coal per ton at works, the process can be employed without increasing the production costs.

(3) Distribution costs are not seriously increased by changing over to the lower C.V., though this conclusion requires some modification when the change involves compression in place of distribution by holder pressure.

(4) The change may involve considerable capital costs, but these will probably not—except in small undertakings—cause any serious increase in the cost of gas manufacture or distribution.

(5) There may be local difficulties that render the change in C.V. inadvisable, but since local conditions may, on the other hand, admit the use of a lower C.V., there should be retained the power to adopt a system of total gasification that can be applied by the use of known and proved processes.

(6) To make total gasification attractive in the light of the known and probable demand for coke when properly marketed and prepared, a cheaper process is desirable than the dual process here discussed. This process should reduce capital costs and labour charges by combining carbonization with gasification of the coke in a single simple apparatus capable of automatic operation.

Calorific Value of Gas

YESTERDAY, TO-DAY, AND TO-MORROW

Discussion on the Address by Mr. James Jamieson to the Scottish Junior Gas Association.—See "JOURNAL" of Dec. 17, 1941, p. 426.

(*Continued from p. 27*)

Mr. **Athol Brown** (Alloa): Mr. Jamieson's reference to the reduction of organic sulphur compounds in town gas, effected by the use of benzole recovery plant, is worthy of emphasis. Our experience at Alloa over the past six years gives ample evidence of this fact, considering the negligible maintenance required by water heaters, &c., and the reduced SO_2 content in the products of combustion in flueless heaters.

What in the Author's opinion is the minimum size of works which might consider the installation of C.W.G. plant as an augmentation to vertical retorts and for the purpose of utilizing excess coke stocks?

Mr. Jamieson asked in 1922: Can a one-stage process, carbonizing ordinary Scotch coal, produce gas of 500 B.Th.U. quality constant enough to comply with the Gas Regulation Act, and, if so, can that quality be produced in verticals economically in comparison with the two-stage process? I am far from convinced that such is the case—and that is after a long experience with the carbonization of Scotch coal in vertical retorts. Would Mr. Jamieson tell us what considerations induced him to change his opinion and instal verticals at Granton?

I am fully convinced in the light of my own experience that a gas of 435/450 B.Th.U. per cu.ft. is the most satisfactory from an economic viewpoint, from a distribution viewpoint, and from the consumer's viewpoint, either domestic or industrial. Mr. Jamieson's data bear this out.

I find it difficult to understand Mr. Jamieson's latest suggestion that a standard calorific value of 425 B.Th.U. per cu.ft. should be adopted for Scotland. Am I correct in attributing his preference for 425 B.Th.U. gas against 450 B.Th.U. gas, as previously recommended, to the condition of the coke market, which, Mr. Jamieson states, is a more pressing question at the moment than any other problem before us. Personally I think that an Industry which rightly resents having to purchase a high percentage of inerts in its raw materials should hesitate to inflict in turn upon their consumers a product having an excessive percentage of inert constituents. Therefore, supply a gas which strikes a balance between economy in production and service to the consumer—namely, 435/450 B.Th.U. per cu.ft.

Has Mr. Jamieson in mind, apart from the points raised in his Address, any other advantages to be gained by the adoption of a standard calorific value—*e.g.*, greater simplicity, ease of regulation, and reduced costs of producing standardized gas appliances.

In conclusion, I should say the Gas Industry might need, but does not want, a universal standard calorific value. I suggest 435/450 B.Th.U. per cu.ft. should be the minimum figure, the margin of 15 B.Th.U. being allowed for those works recovering benzole.

Mr. **David Fulton** (Helensburgh) wrote: To the general argument of the Address that standardization of calorific value is a desirable objective I offer no criticism. The advantages are clear if less momentous than its advocates seem to think. But the moment we touch the point of definite calorific value standards we are on very debatable ground, if for nothing else than the danger that such defined standards may lead to a static condition and make changing with the changes less easy. The Address shows how changes from higher to lower values have steadily occurred, and who will say that the downward tendency may not be further accelerated by war conditions?

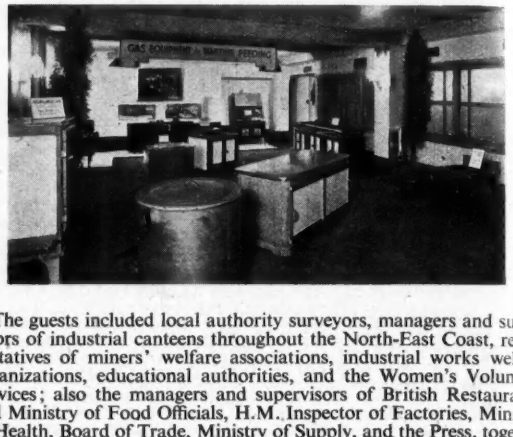
Brought up in a school adhering to high quality gas, for many years I advocated as most suitable for all purposes gas with a bit of fat in it. But changing conditions and experience have compelled modification of that view. For several years back I have felt that the future welfare of the Gas Industry is married to progress with processes of total gasification of coal. The present methods of gas manufacture are too complex and involve far too high an expenditure of capital. I fail to see the soundness of a policy dependent on residual products whose values are of a very unstable description. The enormous amount of capital plant required for the manufacture and handling of these products does not require to be laboured; nor does the complexity of marketing with its changing fortunes. It requires little imagination to see in the mind's eye the simple gas-works of the future where only coal and ashes require to be handled and the plant for gas-making is shorn of complications; greatly less in cost; demanding less manual labour because automatic; so allowing concentration of energy on the business of selling one product—gas. No more coke problem! There is something to strive for beside which present conjurings with calorific value standards are but diversions.

It is because of this conception of the future that I am diffident about espousing any quality of gas, 400, 425, 450 B.Th.U., as the most suitable. Amid all his arguments Mr. Jamieson says the right thing when he remarks that the best calorific value to supply is that which gives the consumer the cheapest efficient service.

(*To be continued*)

Canteen Catering Equipment Exhibition

A preview of the new film produced by the British Commercial Gas Association entitled "Eating at Work," and an Exhibition of Canteen Catering Equipment from the pool of the Ministry of Food and supplemented by equipment from appliance manufacturers were the features of a highly successful display under the auspices of the Northern District of the British Commercial Gas Association, at the Chief Showroom of the Newcastle and Gateshead Gas Company to a large and important gathering last month.



The guests included local authority surveyors, managers and supervisors of industrial canteens throughout the North-East Coast, representatives of miners' welfare associations, industrial works welfare organizations, educational authorities, and the Women's Voluntary Services; also the managers and supervisors of British Restaurants, and Ministry of Food Officials, H.M. Inspector of Factories, Ministry of Health, Board of Trade, Ministry of Supply, and the Press, together with various directors and managers of other gas undertakings who shared with the Newcastle Company the honour of being hosts. In all, 130 people attended the afternoon performance on Dec. 17.

The Next Meeting of the Central Executive Board of the National Gas Council will be held on February 10, at 1.30 p.m.

The Meeting of the Gas Education Executive Committee of The Institution of Gas Engineers provisionally arranged to be held on Tuesday, Jan. 20, at 2 p.m. has been cancelled.

The 1941 Edition of the Official Directory of the British Chemical Plant Manufacturers' Association has now been published. The Directory is issued gratis to enquirers genuinely interested in the purchase of British chemical plant. Application should be made to the Association at 166, Piccadilly, W. 1.

A Meeting of the Eastern District of the Southern Association of Gas Engineers and Managers will be held at Gas Industry House on Friday, Jan. 23, at 11 a.m., when a Paper (accompanied by lantern-slides) entitled "War Damage in Gas-Works" will be presented by Mr. J. S. Thorman, Deputy Chief Engineer of the Gas Light and Coke Company. To comply with Government Regulations tickets of admission are necessary, and members desiring to attend should make early application to the Hon. Secretary, W. A. Howie, Gas-Works, Maidstone.

The Ministry of Works announces that it may now issue authorizations to manufacturers of cast iron hot water boilers (including gas-fired boilers used for central heating), radiators, and radiator fittings, solid fuel stoves, grates, ranges, and cooking apparatus, ventilating and air-conditioning equipment of fixed type, and certain other items of builders' goods, for the essential requirements of the home civil trade, excluding requirements for work subject to a building or maintenance licence under Defence Regulation 56A. Goods made under these bulk authorizations are available for distribution to merchants for sale for essential purposes, without further authorization.

Goulburn is the twelfth largest provincial town in Australia, and is situated 137 miles from Sydney and 65 miles from Canberra. Almost the whole of the shares in the City of Goulburn Gas and Coke Company, Ltd., have been acquired by the Gas Supply Company, Ltd., whose Chairman, Mr. R. A. Schuchard, states that results so far show that there are considerable prospects of increased business. The undertaking is expected ultimately to become a valuable addition to the Company's interests. The gas manufacturing and purifying plant are in good order, and of sufficient capacity to deal with the output for some years ahead.

Under Australian Legislation the Colonial Gas Association, Ltd., find themselves from time to time required to pay taxes on dividends payable to absentee shareholders and death duties on shares of deceased shareholders who had no assets in the State imposing the taxation. While the legislation purports to authorize the Association to recover the tax or duty from the shareholder or his estate, difficulties have arisen in some instances—especially as there is no express provision in the Articles of Association on the matter. To safeguard the Association against a possibility of having to bear any of this taxation, a meeting is being held to alter the Articles so as to enable the Association to recover the tax. It is stated that many Australian Companies have already amended their Articles in this way.

Gas Products Prices

The London Market Jan. 12.

There is very little movement in the prices of Coal Tar Products, as many of the usual markets are no longer available and pitch/creosote mixture as a fuel oil has taken their place.

Pitch is still a nominal market, but for such quantities as are being sold the price ranges between about 45s. and 50s. per ton. Creosote is about 5d. to 6d. per gallon. With regard to refined tar the price for next season has not yet been definitely fixed and it is expected that this will come under a Direction to be issued by the Coal Tar Controller. Pure toluole remains 2s. 5d. per gallon under the Ministry of Supply Toluene No. 2 Order. Pure benzole is about 1s. 10d., 95/160 solvent naphtha is 2s. 5d. to 2s. 9d. and 90/160 pyridine remains about 13s. 6d. per gallon. All the above prices are *ex* Makers' Works. Naphthalene prices are unchanged and are in accordance with the Control of Tar Order 1941. The Order refers to maximum prices, and the figure for refined crystal naphthalene in 2-cwt. bags and 4-ton lots is £23 per ton delivered.

The Provinces Jan. 12.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 11d. to 1s. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 9d. to 1s. 10d. Creosote, *ex* works, in bulk, North, liquid and salty, 4½d. to 4¾d.; Scotland, 4¼d. to 4¾d.; low gravity, 4¼d. to 4¾d. Fuel Grade, 4d. to 4¼d. Carbolic acid, 60's, 3s. 7½d. to 3s. 9d. Naphthalene, £15 to £20. Salts, drained, £6 to £6 10s.; whizzed 72°, £7 15s.; 78°, £9 5s. Anthracene prices fixed by Controller. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 6d. to 6½d.; filtered heavy oil (min. gr. 1,080), 6½d. to 7d.; heavy anthracene oil gr. less than 1,080, 5¾d. to 6d.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland

GLASGOW, Jan. 10.

Enquiries are numerous. Refined tar 4¾d. to 5d. home and 4¼d. to 4½d. per gallon export. Creosote oil: Specification oil, 5¾d. to 6d.; low gravity, 6½d. to 7d.; neutral oil, 6d. to 6½d. per gallon; all *ex* Works in bulk. Cresylic acid nominal. Pale, 99/100%, 4s. 9d. to 5s. 3d. Pale, 97/99%, 4s. 3d. to 4s. 9d.; Dark, 97/99%, 4s. to 4s. 3d. per gallon; all *ex* Works in buyers' packages. Crude naphtha 6½d. to 7d. Solvent naphtha, 90/160 grade 2s. and 90/190 Heavy Naphtha 1s. 9d. per gallon. Pyridines 90/160 grade 14s. and 90/140 grade 16s. per gallon.

Gas Stocks and Shares

There were no items of particular interest in the Gas Market last week and holders are doubtless awaiting the forthcoming dividend announcements—not possibly with the same degree of apprehension as last year, for in view of the fact that over about two-thirds of 1941 no serious enemy air attacks were suffered by this country, it is probable that most companies operating at home will be able to distribute their usual rates. Whether some of the unlucky ones in 1941 will be more fortunate this year remains to be seen, however.

It is regretted that owing to delay in the arrival of the Official List it is not possible to give the price changes on the week, if any, on the London Exchange. There were no movements in the Supplementary List and only the following few on the Provincial Exchanges:

Newcastle 4 p.c. Pref.	84½—85½	+ 1
Weston-Super-Mare 4 p.c. Deb. (*x.d.*)	80—85	Jan. 5
Ditto 7½ p.c. Deb. (*x.d.*)	133—138	"

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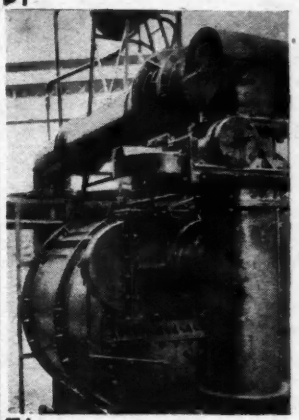

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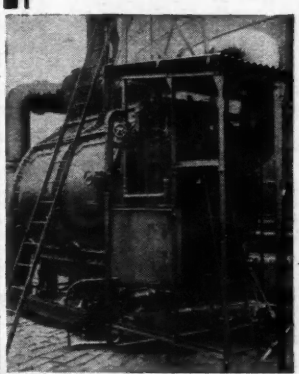

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Shakespeare (Two Gentlemen of Verona).

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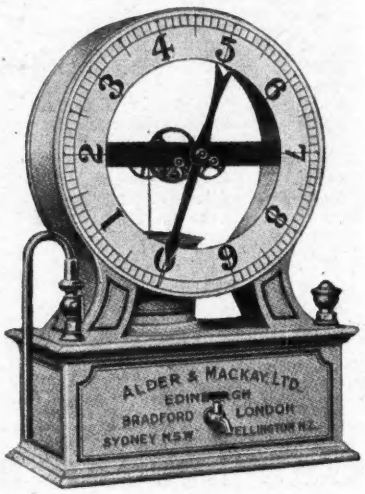

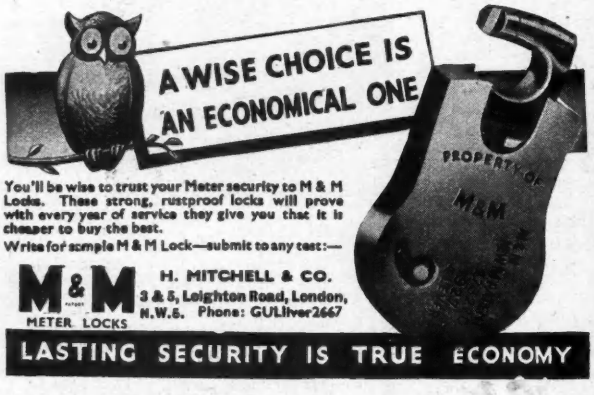

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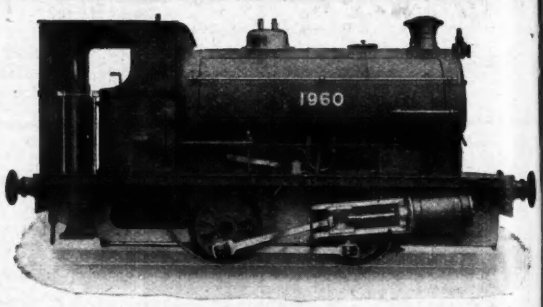

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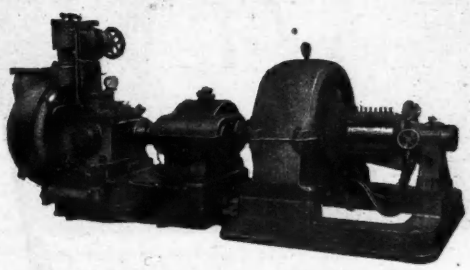

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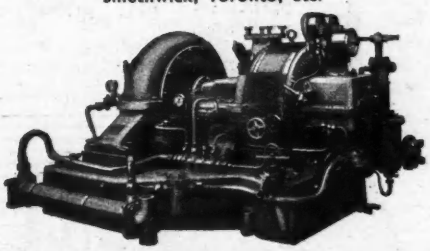

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